PHY 3063: Enhanced Modern Physics
Spring 2026 Syllabus

Instructor
Prof. Jeff Andrews
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(Note: email and Canvas are the best ways to contact me.)

This course complies with all UF policies. For information on those policies and for a list of campus resources, please see this page: https://go.ufl.edu/syllabuspolicies.

Class meeting times & location

MWF, Period 8: 3:00 pm - 3:50 pm
(All times listed in this syllabus are in the Eastern time zone.)
Classroom: NPB 1200

Health & safety

The following recommendations are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- Vaccines are readily available and have been demonstrated to be safe and effective against viruses. Visit one.uf.edu for screening / testing and vaccination opportunities.
- If you are sick, stay home. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 to be evaluated.
- As with any excused absence, you will be given a reasonable amount of time to make up missed work.
- Masks are always welcome within our classroom, regardless of your vaccination status.

Office hours - **Mondays 1-2 pm and Thursdays 11 am - 12 pm**

Office hours will be held in my office (NPB 2164). However, you are always welcome to contact me to set up a meeting outside of office hours.

Course objectives and goals

In 1874 when Max Planck, then only 16 years old, visited Professor Phillip von Jolly at the University of Munich, he was advised to avoid a career in physics, the reason being that only a few details remained to be solved. While the advice seems laughable today, at the time it appeared that only a few outstanding problems remained to be resolved. Essentially, physics made sense: the laws of mechanics and electricity and magnetism accurately and precisely described the surrounding world. Yet, 26 years after receiving that advice, Planck gave a talk on December 14, 1900 to the German Physical Society in Berlin that denoted the origin of quantum theory. Combined with Einstein's descriptions of special relativity in 1905 and general relativity in 1915, quantum mechanics (and its resulting phenomena) defines what we today consider the "modern physics" that we will be exploring in this course.

We will start with a description of special relativity and how we can revisit the laws of mechanics in a special relativistic framework. Then we will explore quantization of energy, momentum, and angular momentum, and how that begs a deeper understanding of the wave nature of particles. This naturally leads us to Schrödinger's Equation, followed by a more accurate description of the structure of the atom. We will follow that up with a foray into atomic physics, solid state physics, nuclear physics, and, if we have time, cosmology.

This course serves as a gateway to advanced physics, providing a taste of a broad array of topics that will be covered in depth later in your physics career. It is therefore, by design, wholly inadequate. Just as soon as we are able to describe and calculate a phenomenon, we move on to the next one. Nevertheless, I expect you'll find this to be one of the more *fun* courses along the way to earning your undergraduate degree, so strap in and enjoy!

Textbook

The required textbook for this course is:

Modern Physics
Kenneth Krane
4th Edition, 2019
ISBN 978-1119495550

Sometimes, for difficult topics, a second, independent explanation can sometimes be helpful. While all textbooks on modern physics that I've seen tend to cover essentially the same material, I recommend consulting with either:

Modern Physics
Randy Harris

2nd Edition, 2007
ISBN 978-0805303087

Modern Physics
Paul Tipler and Ralph Llewellyn
6th Edition, 2012
ISBN 978-1429250788

Prerequisites

These are pre-requisites for this course:

- PHY 2061 - Enriched Physics with Calculus 2
- MAP 2302 - Elementary Differential Equations

Grading

Grading will be based on a scale from 0 to 100 percentage points. The final grade is calculated as follows: 60% exam grades (where Exam 1 and Exam 2 and Exam 3 are each worth 20% of your total grade) and 40% homework. The conversion to letter grades will be done using the following conversion table after rounding the total percentage points to zero decimal places. Grade cutoffs may be lowered, but they will not be raised. Your scores will be entered into Canvas in a timely manner. Below we discuss each component of your grade in more detail.

A	A-	B+	B	B-	C+	C	C-	E
≥88	≥83	≥78	≥73	≥68	≥63	≥58	≥58	<38

Exams

There will be three midterm exams, but no final exam. These exams will be incremental, and not cumulative (although some overlap may be unavoidable) to be held periodically throughout the semester, during the week of Feb 23, Apr 6, and the week of Apr 20. There is no final exam. The time allocated for each exam will be the same: you will be allotted one hour and 50 minutes. However, the format is still to be decided. We will discuss this in class.

Problem Sets

Problem sets will be assigned weekly and will be posted in the “Assignments” module on Canvas. These will be due on Friday afternoon at class time (3:00 pm) and need to be submitted on Canvas. Cooperation on homework is permitted and discussion of problems among students is encouraged. However, everyone needs to turn in their own work. The final homework score is calculated as an average of all homework scores after dropping the two lowest homework scores. Extensions or makeup homework assignments due to extenuating circumstances such as illness or hardship will be reviewed on a case-by-case basis.

Course schedule (tentative – subject to change)

The schedule below lists the topics planned for each lecture, as well as the corresponding chapters and sections in the textbook. This schedule is likely to evolve. Changes will be announced on Canvas as well as during class time. Please check Canvas and your UF e-mail regularly for changes and class announcements. It is your responsibility to be aware of changes posted on Canvas or sent by e-mail.

Week	Date	Topics	Exam	Problem Set
1	Jan 12, 14, & 16	Introduction; Introduction to Relativity (Ch. 2)		
2	Jan 21 & 23	More Relativity (Ch. 2)		1
3	Jan 26, 28, & 30	More Relativity (Ch. 2)		2
4	Feb 2, 4, & 6	Particle-like properties of Light (Ch. 3)		3
5	Feb 9,11, & 13	Wavelike properties of Particles (Ch. 4)		4
6	Feb 16, 18, & 20	Schrödinger’s Equation (Ch. 5)		5
7	Feb 23, 25, & 27	Schrödinger’s Equation Continued (Ch. 5)	Exam 1	6
8	Mar 2, 4, & 6	Hydrogen Atom (Ch. 6)		7
9	Mar 9, 11,	Hydrogen Atom Continued (Ch. 7)		8

	& 13			
–	Mar 16, 18, & 20	NO CLASS – SPRING BREAK		
10	Mar 23, 25, & 27	Many electron atoms (Ch. 8)		9
11	Mar 30, Apr 1, & 3	Molecular Structure (Ch. 9)		10
12	Apr 6, 8, & 10	Statistical Mechanics (Ch. 10)	Exam 2	11
13	Apr 13, 15, & 17	Solid State Physics (Ch. 11)		12
14	Apr 20 & 22	Nuclear Physics (Ch. 12)		
–	Apr 30	FINAL EXAM - 12:30 - 2:30 pm	Final Exam	

Inclusive learning environment

Physics is practiced and advanced by a scientific community of individuals with differing backgrounds and identities and is open and welcoming to everyone. I recognize the value of everyone's individual backgrounds in all aspects of this course. This includes but is not limited to a diversity of age, background, ethnicity, gender identity and expression, national origin, religious affiliation, sexual orientation, and other visible and non-visible categories that you bring with you to our shared study of physics. In this small class, we will be working closely together throughout the semester. I expect that all students will contribute to a respectful and welcoming environment. This includes attentive listening, showing patience with each other, and respect for all questions asked by members of the class.

Physics, like all human endeavors, is something that is learned. My aim is to foster an atmosphere of learning that is based on transparency and respect for all participants. I acknowledge the different needs and perspectives we each bring to our common learning space and strive to provide everyone with equal access. All students meeting the course prerequisites belong here and are well positioned for success.

Accessibility

I am committed to supporting the learning process for all students. You are encouraged to contact me as soon as possible if you are having difficulties in the course. Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center. See "Get Started with the DRC" Disability Resource Center webpage (https://disability.ufl.edu/get-started/). It is important for students to share their accommodation letter with their instructor and discuss their access needs as early as possible in the semester.

Class attendance

Requirements for class attendance, assignments, and other work in this course are consistent with university policies that can be found at:

https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

UF grading policies

Information on current UF grading policies for assigning grade points can be found here:

https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

Online course evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online. Students can complete evaluations in three ways: [1] The email they receive from GatorEvals; [2] Their Canvas course menu under GatorEvals; or [3] The central portal at https://my-ufl.bluera.com. Guidance on how to provide constructive feedback is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

The Honor Pledge

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: 'On my honor, I have neither given nor received unauthorized aid in doing this assignment.' The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. See the UF Conduct Code website (http://www.dso.ufl.edu/sccr/process/student- conduct-

honor-code/) for more information. If you have any questions or concerns, please consult with the instructor or TAs in this class."

In-class recording policy

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A class lecture is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To publish means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Campus resources

Health, wellness, & basic needs

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or (352) 392-1575 so that a team member can reach out to the student.
- Counseling and Wellness Center: https://counseling.ufl.edu/, 392-1575 (or 9-1-1 for emergencies).

- Title IX Office: 427 Yon Hall, https://titleix.ufl.edu/get-help/ (Includes a list of on- & off-campus resources)
- Student Health Care Center, 392-1161, https://shcc.ufl.edu
- UF Aid-a-Gator Program. Provide grants to students experiencing unanticipated expenses due to an emergency situation. https://www.sfa.ufl.edu/aidagator/

Academic resources

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learningsupport@ufl.edu. https://lss.at.ufl.edu/help.shtml.
- Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. https://career.ufl.edu/
- Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.
- Academic Resources, Turlington Hall. General study skills and tutoring. https://academicresources.clas.ufl.edu
- Writing Studio, 2215 Turlington Hall. Help brainstorming, formatting, and writing papers. http://writing.ufl.edu/writing-studio/
- Student Complaints: https://registrar.ufl.edu/writtencomplaints; http://distance.ufl.edu/student-complaint-process/